

#### **Project 4:** Mutant Population in Adapted SRW Wheat to Reduce FHB Susceptibility and DON Content

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##### **1. What are the major goals and objectives of the research project?**

- 1) Development of an advanced generation mutant platform in adapted high-yielding FHB susceptible soft red winter wheat cultivar “Shirley”
- 2) Screening of mutant population to identify mutant lines showing moderate to resistant phenotypes and validate the phenotypes
- 3) Confirm the phenotypic mutants by characterizing them in greenhouse and field tests

##### **2. What was accomplished under these goals or objectives? (For each major goal/objective, address these three items below.)**



Fig. 1. A snapshot of the GH showing the evaluation of Jagger mutant population for the FHB resistance. Jagger is highly susceptible so any phenotype showing moderate to resistance phenotype can be related to either disease escape or genetic resistance.

In initial screening we found Jagger mutant population exhibited much clearer phenotypic response than Shirley. So, we further evaluated a Jagger deletion mutant population of 854 individuals. This population has skim sequencing data so deletions can be quickly correlated with loss of a specific genomic region. Earlier we identified 12 Jagger and 8 Shirley mutant lines showing enhanced resistance under initial GH and field evaluations. Further evaluation confirmed 6 true Jagger deletion mutants. Further we screened another set of 625 lines (4 plants each) and it allowed us to identify another 21 mutants. So, this panel has allowed us to identify 27 total mutants from the screening of 854 from Jagger deletion panel. These

mutants are being tested again in replicated sets. Work is in progress in correlating the deletions with an increase in genetic resistance. Samples are already shipped for the DON analysis.

**What were the major activities?**

Advancing the generation of the mutant populations using single seed descend to avoid loss of undetected mutants due to segregation and mutant dilution.

Field testing of mutant lines in the inoculated misted nursery and tagging the possible mutant plants within the headrows. Harvesting the individual spike showing positive response.

**What were the significant results?**

We have identified 27 Jagger mutant lines showing enhanced resistance under initial GH and field evaluations. Since all the Jagger deletion lines are genotyped, we may be able to associate a specific genomic region with enhanced resistance.

**List key outcomes or other achievements.**

27 Jagger mutants with enhanced FHB resistance

6 mutants identified in previous set; we confirmed through a high-confidence rigorous phenotyping. These can be used to identify specific chromosomal regions harboring S genes.

**3. What opportunities for training and professional development has the project provided?**

Lines	Count
Lines screened	852
Resistant (score 2-4)	26
Moderately resistant (score 5-6)	10

Three PhD students, one MS student, one postdoc, and three undergraduate students were trained under this project. All the trainees worked with the PI to conduct the nursery and collect and analyze data. These students also participated in conferences and commodity board meetings with their work.

**4. How have the results been disseminated to communities of interest?**

The PI presented the results in oral presentations and disseminated updates on FHB in wheat and barley through emails. PI presented the research updates in the FHB forum as well as online project update meetings. The graduate students in the team presented the results as posters and handouts to the stakeholders in commodity board meetings. The results were published as wheat trial Factsheets and was disseminated via emails and the UMD extension system to the broader grower community.

**5. What do you plan to do during the next reporting period to accomplish the goals and objectives?**

To perform RH mapping to identify overlapping chromosomal bins to localize the physical location of FHB susceptibility gene (s).