Project Abstract

Project Title:	Winter Barley Mutant Resource to Increase FHB Resistance and to Reduce DON Content	
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FHB is a devastating disease for barley production. Despite the identification of a number of QTLs, no total resistance has been identified so far in barley against FHB. These limitations suggest exploring complementary approaches to enhance scab resistance in barley. Recently, a number of studies have suggested that resistance against plant pathogens can be increased by knocking out candidate genes that facilitate pathogen infection and colonization. These genes or factors are called Susceptibility factors. There have been some mutant resources developed in spring barley germplasm. However, a smaller population of mutant populations and different growth habits limits the quick deployment of useful mutant alleles in winter barley cultivars. In this proposal we will utilize large winter barley TILLING population developed is a highly FHB susceptible background to identify mutant phenotypes showing resistant phenotypes against scab.

Objectives

1) Phenotypic Evaluation of M4 plants in headrow design under misted scab nursery
2) Evaluation of selected mutant families in greenhouse under point inoculation
3) Confirmation of mutants and sharing of germplasm

The project will deliver resistant barley germplasm with marker information to deploy mutant alleles in the barley breeding program. Overall, this project will lead to the development of barley varieties with improved resistance against FHB and with reduced DON content.

Under this project we will first perform the screening of 4600 M4 head rows from winter barley Nomini TILLING population generated from EMS-induced mutagenesis. After screening the population, critical plant-based phenotyping will be done as described in Chhabra et al. 2021 to identify individual mutant plants showing resistant phenotype. These plants will be tagged and seeds from these plants will be harvested separately, and samples will be shipped for DON estimations. In fall 2023, these selected promising lines will be tested in the green house under point inoculations for FHB resistance and seeds will be used to DON estimation. Confirmed lines will be used to develop Mutmap populations. Backcrossed stable lines will be shared with barley breeding programs across the USA for their effective utilization in adding us scab resistance.