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Project Title: Effect of inoculum density and weather on Fusarium head blight of wheat.

PROJECT 2 ABSTRACT
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The shift to conservation tillage methods of crop production was a major contributor to destructive epidemics of *Fusarium* head blight (FHB) of wheat and barley in the U.S. in the 1990s. Susceptibility of widely grown cultivars also contributed to epidemics. Bringing FHB under control will require multiple disease management strategies, based on understanding its epidemiology. Crop rotation or tillage to reduce the amount of residue that harbors the pathogen might contribute to a disease management program, but the effects of these practices on reducing inoculum levels are poorly understood.

In this study, we hypothesize that local inoculum abundance, in addition to weather, exerts control over the incidence of FHB. The limiting effect of inoculum abundance is most likely to be evident under weather conditions only moderately conducive for disease. To test this hypothesis we will sow 3 wheat cultivars of different maturities at 2 planting dates in order to create a range of flowering dates in the experiment. Three different densities of corn residue will be scattered in the plots to create different densities of primary inoculum (perithecia and ascospores of *Gibberella zeae*). The experiment will be set up as a split-plot randomized complete block. Main plots will be planting date, sub-plots will be density of corn residue, and sub-subplots will be cultivar. Strips 30-ft wide of wheat cultivar Goldfield, moderately resistant to FHB, will separate subplots and main plots from each other. Corn residue (chopped stalks) will be applied at 0, 15%, and 80% ground cover. In the spring we will monitor air temperature, relative humidity, plant surface wetness, soil surface wetness, solar radiation, and wind speed and direction with a Campbell automated weather station that records values at half-hourly intervals. We will monitor airborne propagules of Fusarium with Burkard spore samplers (one in each residue treatment) and by directly assaying wheat heads. We will monitor the increase in FHB incidence and severity over time in one cultivar-planting date combination over the 3 residue treatments, and will assess incidence and severity in all treatments at the late milk and early dough stages of grain development. We will also compare FHB incidence and severity in small plots that are inoculated with a wild type strain of *G. zeae* and mutants that lack the ability to produce ascospores.

The goal of this work is to quantify the effect of primary inoculum abundance on FHB development and to incorporate this information into a weather-based disease forecast. The experiment with the mutant strains is intended to quantify the relative importance of ascospores versus macroconidia as primary inoculum. Results will help determine the value of field-scale residue management on local FHB epidemics.