PI: Cory Hirsch
PI's E-mail: cdhirsch@umn.edu
Project ID: FY21-HI-013
ARS Agreement #: *New*
Research Category: TSCI
Duration of Award: 1 Year
Project Title: Efficacy of Mineral Rover for High Fidelity/Temporal Resolution of Field FHB Severity

PROJECT 1 ABSTRACT
(1 Page Limit)

Fusarium head blight (FHB) is a devastating disease of wheat and barley that can markedly reduce both yield and grain quality. FHB research projects rely on field phenotyping of severity, but current disease assessment methods are labor intensive, costly, subjective, and relatively low throughput. Increasing the throughput in multiple ways for FHB field assessments is necessary for continued improvement of resistant varieties and efficacy of management practices for FHB.

The overall goal of this project is to determine the effectiveness of a highly sophisticated phenotyping rover developed by Mineral, a project of X which is a division of Alphabet Inc, the parent company of Google, for high temporal and fidelity FHB detection in wheat and barley. The specific objectives of this proposal are:

1) Deploy the Mineral phenotyping rover to assess FHB severity in wheat and barley plots.
2) Team with Mineral to develop machine learning models for FHB severity in imaged plots.
3) Determine the efficiency and cost-benefits of the Mineral rover compared to conventional assessment methods.
4) Use image based FHB detection to model terminal FHB severity and DON levels.

In spring 2021, we will begin by conducting the necessary training/setup of the rover to ensure efficient and effective image capture throughout the summer. We anticipate intensively phenotyping with the rover twice per week beginning in July/August at two research sites. During the fall and winter 2021, we will begin assessments of cost benefits and develop models for FHB severity, determine model efficacy, and model terminal FHB severity and DON concentration.

This research is aimed at improving high throughput FHB detection and directly addresses VDHR Objective 3 (enhance selection efficiency through high throughput phenotyping). This research is transformational as outputs from this work would be suitable for any USWBSI researcher who could benefit from an easy to use, high throughput phenotyping rover for field FHB detection in wheat and barley, especially Research Areas in MGMT, GDER, PBG, and the Coordinated Projects for barley, bread wheat and durum wheat. We envision eliminating field FHB phenotyping limitations faced by many researchers and in subsequent years foresee working with collaborators to increase the phenotyping capabilities of their research programs and work to increase the amount of germplasm screened for FHB resistance and leverage outputs for increased gains in genomic selection models.