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Project ID: FY20-BA-017

ARS Agreement #: *New*

Research Category: BAR-CP

Duration of Award: 1 Year

Project Title: Enhancing FHB Resistance in Barley Cultivars in the Western US

PROJECT 1 ABSTRACT

(1 Page Limit)

FHB damage in spring barley continues to increase in southern and eastern Idaho. In 2015, fields of barley had disease and many spring wheat fields tested at >5 ppm DON, even after appropriate treatments with fungicides. In 2018, one Rupert grower had 30-40,000 bushels of barley rejected due to high DON levels. The majority of the barley varieties that are available to growers in the area are susceptible to FHB. Growers need information on FHB susceptibility of the varieties that currently are being grown and those newly released. Breeders need information on advanced lines and breeding material to release selections with reduced vulnerability to FHB damage and DON accumulation. Screening in 2014-2019 has allowed us to rank currently grown barley lines for relative FHB susceptibility. However, the majority of the varieties in production are susceptible and remain vulnerable under the highly conducive environment that occurs under irrigated production. Continuing the screening project will allow us to characterize new releases and identify resistance within breeding populations and advanced lines. A screening nursery has been developed with an irrigation system to meet the irrigation needs of the crop. A supplemental misting system was installed in addition the irrigation in order to provide appropriate moisture to facilitate disease development. Inoculation with *Fusarium graminearum* (*Fg*) colonized corn spawn resulted in excellent development of disease in spring wheat but not in barley. Therefore, barley was also inoculated with a spore suspension of *Fg* macroconidia, resulting in excellent symptom expression, but required increased development capacity of inoculum (e.g. bioreactor generated macroconidia) and appropriate timing of spray inoculation, allowing for identification of susceptible barley and the selection of resistance in breeding material. An additional nursery was developed in Kimberly, ID to begin testing of winter material. Reduction of FHB, FDK and DON in the harvested grain must start with selection of appropriate varieties that also meet the need of the industry for yield and end-use quality. This nursery allows us to do that by calculating the *Fusarium* disease index and testing harvested material for DON in conjunction with the USWBSI supported DON testing at the University of Minnesota. Finally, the impact of regionally derived isolates on nursery results have not been thoroughly tested and may change decisions of how nurseries are utilized by breeding programs. Testing isolates used in US nurseries in a controlled environment growth chamber against a standard panel of barley lines will evaluate line by isolate interactions to determine the influence isolates may have on resistance.

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Project ID: FY20-SP-008

ARS Agreement #: *New*

Research Category: VDHR-SPR

Duration of Award: 1 Year

Project Title: Determining FHB Susceptibility in Wheat Cultivars in the Western US

PROJECT 2 ABSTRACT

(1 Page Limit)

FHB damage in spring wheat continues to increase in southern and eastern Idaho. In 2015, fields of both wheat and barley showed signs of the disease and many spring wheat fields tested at >5 ppm DON, even after appropriate treatments with fungicides. Incidence in the area is sporadic and usually associated with localized corn production. The majority of the grain varieties that are available to growers in the area are susceptible to FHB, especially the hard white spring wheat and durum varieties. A few varieties of hard red and soft white spring wheat have some level of resistance associated with the presence of the *Fhb1* gene. Soft white spring wheat has shown the lowest vulnerability to FHB infection in the field, but high levels of DON are being reported even in soft white spring wheat in some years. Growers need information on FHB susceptibility of the varieties that currently are being grown and those newly released. Breeders need information on advanced lines and breeding material to release selections with reduced vulnerability to FHB damage and DON accumulation. Screening in 2014-2019 has allowed us to rank currently grown wheat and barley lines for relative FHB susceptibility. However, the majority of the varieties in the production area are susceptible and remain vulnerable under the highly conducive environment that can occur under irrigated production. Continuing the screening project will allow us to characterize new releases of wheat and give us the ability to identify higher levels of resistance within breeding populations and advanced lines. The screening nursery has an irrigation system to meet the irrigation needs of the crop and provide appropriate moisture to facilitate disease development in spring wheat. Inoculation with *Fusarium graminearum* (*Fg*) colonized corn spawn resulted in excellent development of disease in spring wheat in almost every year we have conducted the screening. Reduction of FHB, FDK and DON in the harvested grain must start with selection of appropriate varieties that also meet the need of the industry for yield and end-use quality. This nursery allows us to do that by calculating the Fusarium disease index and testing harvested material for DON in conjunction with the USWBSI supported DON testing at the University of Minnesota.

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Project ID: FY20-IM-022

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Research Category: MGMT

Duration of Award: 1 Year

Project Title: Efficacy of a New Fungicide for FHB and DON Management in Idaho Integrated Management Studies

PROJECT 3 ABSTRACT

(1 Page Limit)

FHB damage and DON contamination of grain in the Intermountain West has been sporadic and highly dependent on temperature prior to and during anthesis. Rainfall is less of a factor due to irrigation that supplies constant moisture and humidity at all times to some parts of the field. As current FHB prediction models are ineffective in this environment and resistance is limited in most of the varieties currently in production, participation in the Integrated Management trials have provided excellent guidance in the utilization of fungicides paired with host resistance classification to control and / or reduce the impact of FHB. We will participate in the FHB Management Coordinated Project (MGMT_CP) to evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in spring wheat grown in the Pacific Northwest and Intermountain West region, with emphasis on a new fungicide, Miravis Ace. As part of the Uniform Fungicide Trials (UFT), we also will be comparing the efficacy of Miravis Ace when applied at early heading or at anthesis to that of standard anthesis application of Prosaro or Caramba. The objective is to generate data to further quantify the economic benefit of FHB/DON management strategies and to develop more robust “*best-management practices*” for FHB and DON. This will assist in the generation of data to validate and advance the development of FHB and DON risk prediction models. With the expansion of FHB into irrigated production areas of the PNW and Intermountain West, and the limits of currently available fungicides, testing of the newly available fungicide Miravis Ace may provide increased choices for the area producers. Data from this underrepresented region will add value to the Coordinated Project while developing tools to increase our ability to forecast disease occurrences in unique and problematic environments.