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Project Title: Coordination of the NABSEN and Collaborative Screening of Western US Barley Germplasm.

PROJECT 1 ABSTRACT

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The goal of this project is to promote collaboration between North American barley breeding programs to advance and distribute elite barley germplasm with resistance to *Fusarium* head blight. Midwestern barley breeding efforts to develop adapted varieties with acceptable resistance to FHB and DON accumulation has made steady progress in the last two decades. To maintain this trajectory towards acceptable levels of genetic resistance to FHB it is essential to continue the North American Barley Scab Evaluation Nurseries (NABSEN). One of the limiting factors in the development of adapted barley varieties with improved type I resistance and lower DON accumulation was the availability of FHB nurseries across a range of environments with sufficient levels of disease. The NABSEN has consistently established sufficient levels of infection across a wide range of environments including Crookston and St. Paul, MN, Osnabrock, Fargo and Langdon, ND, and Brandon, MB Canada. The coordinated screening effort will evaluate advanced breeding lines with putative FHB resistance from four barley breeding programs in the upper Midwest US and two breeding programs in Canada. This project will coordinate the NABSEN, establish misted irrigated nurseries at the Fargo and Langdon, ND locations, and coordinate the evaluation of western breeding materials. The determination of *Fusarium* head blight severity and deoxynivalenol (DON) accumulation for each entry replicated at least twice per location allows for the robust and timely evaluation of material coming out of multiple breeding programs. The NABSEN has made it possible for Midwestern breeding programs to evaluate their elite materials and make head to head comparisons of lines from different programs containing distinct genetic resistances and now there is a need to include western adapted breeding lines. Utilizing the screening expertise gained by the Midwestern pathologists and breeders will expedite the process of determining the levels of resistance and/or susceptibility in the western breeding material providing breeders with baseline knowledge of the native FHB resistance in their adapted germplasm. This has become necessary as FHB moves west with corn production. Continuing the coordinated NABSEN effort will allow breeders in all FHB prone regions to simultaneously evaluate their lines with those from other programs and give western breeders a jumpstart in breeding for FHB resistance. The access to robust FHB phenotyping, resistant germplasm and genotype data of the NABSEN lines will assist breeders in moving FHB resistant QTL into their elite lines.