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PROJECT 1 ABSTRACT
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The current levels of FHB resistance in barley cultivars grown in the Midwest are not sufficient to consistently reduce risks to producers. Maltsters and brewers in the U.S. require a steady supply of high quality barley and disease outbreaks result in grain contaminated with DON diminishing that supply. Recently, there has been increased industry demand for two-row barley and new interest in winter malting barley requiring additional breeding efforts for these market classes. Therefore, our overall goal is to develop new barley cultivars with improved disease resistance and lower DON that are adapted to the Midwest growing environment and acceptable for the malting and brewing industries. Our specific objectives are: 1) create new breeding populations by crossing parents that carry resistance to FHB and other desirable traits; 2) conduct selection for FHB resistance and lower DON concentration in segregating breeding populations using genetic markers and field screening; and 3) advance lines to regional testing and industry evaluation that are candidates for new cultivar releases. We expect a steady flow of improved cultivar candidates entering industry testing that have improved FHB resistance, lower DON, good field performance in the Midwest and quality attributes desired by end-users. We currently have four breeding programs: spring six-row, spring two-row, winter six-row (no new crossing) and winter two-row. On an annual basis, we will make at least 100 crosses for spring barley and at least 50 crosses for winter barley (two-row). We will advance lines by single seed decent to the F3, genotype them with SNP markers, use genomic selection to make predictions on multiple traits, and select lines to advance to yield trials. Selected lines for advancement will be entered into yield trials at three locations and FHB nurseries at two locations. Approximately 30 lines from each program will be advanced to 2nd year trials at five locations and screened in two FHB nurseries. Third year entries will be repeated again at five locations and also possibly entered into region trials. Up to eight advanced lines in these regional trials will be evaluated in the North American Barley Scab Evaluation Nursery (NABSEN) in multiple locations including the two we plant two in St. Paul and Crookston. Lines performing well in industry pilot testing will be considered for plant scale brewing evaluations and eventual release as new cultivars. New cultivars will reduce disease risk to growers and encourage more production of malting barley to supply end-users.