Minnesota Wheat Research and Promotion Council
FULL RESEARCH PROPOSAL TEMPLATE
For Crop Years 2026 and 2027 (01/01/2026 to 12/31/2027)

(Maximum Two Pages, Plus Itemized Budget)

Please Note: To speed up and streamline the granting process, we now require full proposals to be submitted by 11:59 PM CST on November 15, 2025. You will need to include an itemized budget with your proposal that has been approved by your organization's accounting and/or sponsored programs department.

Project Title: **Continued provision of rapid end-use quality characterization services to the University of Minnesota Wheat Breeding Program**

Principal Investigator(s): Dr. George Amponsah Annor
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Project Period: Jan 1, 2026 - December 31, 2027

Requested Amount: $ 30,000 ($15,000 annually)

Abstract

(Provide a brief lay-person summary of the project for wheat producers and industry representatives familiar with wheat production, but unfamiliar with your particular area of research.)

Over the past several years, the Cereal Chemistry Laboratory in the Department of Food Science and Nutrition led by Dr. George Annor has provided the University of Minnesota Wheat Breeding Program with rapid end-use quality characterization services. With prior support from the Minnesota Wheat Research and Promotion Council (MWRPC), our lab has developed predictive models for estimating key end-use quality parameters such as Farinograph water absorption using the Gluten Peak Tester (GPT). These models have enabled rapid screening of over 3000 wheat samples, drastically reducing the time and resources needed to evaluate early-generation breeding lines. Without this service, comprehensive end-use quality screening would not be feasible at the early stages of breeding, limiting the program's ability to identify promising lines with desirable processing qualities. As current funding concludes, continued support is critical to maintain this rapid evaluation pipeline, ensuring that the Minnesota Wheat Breeding Program can sustain genetic improvement efforts in end-use quality traits. This project directly supports efficient variety development, reduced screening time, and improved breeding decision-making.

Describe the background for your proposed project and the importance of this project to the profitability of wheat production in MN:

The MWRPC's investment in optimizing the Gluten Peak Tester (GPT) as a high-throughput screening tool has been transformative. The Cereal Chemistry Laboratory successfully developed robust predictive models linking GPT data to Farinograph water absorption and other end-use attributes. Conventional testing using Farinograph and Mixograph systems requires large grain quantities (≥60 g) and extensive operator time, which restricts their use in early breeding generations. The GPT, however, requires only 20g of grain, eliminates operator bias, and produces reliable, reproducible data in a fraction of the time. Over 3,000 samples have been analyzed through this rapid testing platform, supporting the breeding program's selection process for superior lines. As the prior funding cycle (2023 - 2025) ends, renewed support for 2026 - 2027 is requested to ensure the uninterrupted delivery of this essential analytical service to the wheat breeding program. Over the past 3 years, this GPT has contributed to genomic prediction models that have allowed us to predict gluten strength and water absorption on ~1,500 untested lines. This data fills a critical void in our breeding pipeline, i.e. an end-use quality profile/prediction more than a year before lines are evaluated in multi-location trials and we receive data from the USDA-ARS lab in Fargo.

Objectives

1. Continue providing rapid end-use quality characterization of early-generation wheat breeding lines using the GPT.
2. Support decision-making in advancing lines based on early indicators of water absorption and gluten strength.
3. Maintain and refine predictive models to improve screening accuracy and throughput efficiency.

Research methods:

Each year, approximately 1,000 wheat lines (500 from pre-yield trials and 500 from preliminary yield trials) will be screened using the GPT. These represent a larger pool of 2,500–3,000 lines developed annually. The GPT will be used to measure gluten aggregation characteristics, and predictive models will estimate Farinograph water absorption. Only 20 g of grain is required for each GPT test. 25–30% of lines typically exhibit weak gluten and are discarded early, optimizing downstream processing. Pre-yield trial lines will be screened between October - January, and New Zealand seed-increase lines between April - August.

Table 1: Sampling tracking and analysis information

Generation	**No. of Lines**	**Locations**	**Data Collected (Provider)**	**Timeline***
F5	500	1	GPT (Annor Lab)	Oct–Jan
F6 (PY)	500	1	GPT (Annor Lab)	Apr–Aug
PY	160	2	Full mill & bake (USDA-ARS, Fargo)	Mar–Jul
AY3–6	40	2	Full mill & bake (USDA-ARS, Fargo)	Mar–Jul
AY2	40	2	Full mill & bake (USDA-ARS, Fargo)	Nov–Dec
AY1	60	2	Full mill & bake (USDA-ARS, Fargo)	Nov–Feb

* The timeline with respect to data from the USDA-ARS has more aspirational in recent years due to the lab's move from Harris Hall to the Peltier Complex from 2023-2024 and now the federal government shutdown. We have no USDA-ARS quality data from the 2023 crop year samples and partial data from only one trial, AY2, from 2024. This makes us even more reliant on the GPT data.

Outline the timeline for completion:

The two-year project period (2026–2027) will involve continuous sample reception and GPT screening (Oct–Aug annually), model updates and data integration with the breeding database, and annual reporting to MWRPC and dissemination through professional meetings.

What methods, if any, will be used to disseminate your research findings out to the greater public, beyond the final report due to Minnesota Wheat Research and Promotion Council:

Results will be shared through peer-reviewed journal publications, presentations at the Prairie Grains Conference, Cereals & Grains Annual Meeting, and variety registration reports. Feedback will also be provided directly to breeders and growers through internal UMN-MWRPC coordination meetings.

List potential collaborators or co-investigators you may consider inviting to participate:

N/A

Budget requirements:

Item	Annual Cost	Total (2 years)
Undergraduate salary for running GPT of samples	$13,000	$26,000
Lab supplies	$1,000	$2,000
Travel	$1,000	$2,000
Total	$15,000/year	$30,000

List sources and amounts of additional funding for this project, and indicate if they have committed to provide funding or if you have requested funding:

N/A

Submit full proposal (max. 2 pages) and itemized budget to bsorenson@mnwheat.com by 11:59 PM, 11/15/25