


Minnesota Wheat Research and Promotion Council

RESEARCH PROPOSAL GRANT APPLICATION

1. NAME AND ADDRESS OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Name: Regents of the University of Minnesota Address: Sponsored Projects Administration 450 McNamara Alumni Center, 200 Oak Street SE Minneapolis, MN 55455-2070		
2. TITLE OF PROPOSAL Continued provision of rapid end-use quality characterization services to the University of Minnesota Wheat Breeding Program		
3. PRINCIPAL INVESTIGATOR(S) 1. Dr. George Amponsah Annor PI# 2 Name: Dr. James Anderson PI# 3 Name:	4. PI #1 BUSINESS ADDRESS Department of Food Science and Nutrition University of Minnesota 1334 Eckles Avenue Saint Paul, MN, 55108	
5. PROPOSED PROJECT DATES (calendar years) Jan 1, 2024 - December 31, 2026 2025 per M Carlson email 01/19/2024 - 2 yr contract	6. TOTAL PROJECT COST \$ 30,000	7. PI #1 PHONE NO. 612 512 5647
8. RESEARCH OBJECTIVES: (List objectives to be accomplished by research grant) Note: Research Reports are Due November 15th of Each Year 1. Determine the protein hydrolysis kinetics of wheat samples using the Gluten Peak tester 2. Calculate the water absorption and other dough characteristics of samples using regression models developed earlier Attach a 2-page detailed discussion of importance of the proposal to wheat profitability; how study complements previous research in area; procedures to be used; and competency of the research group in achieving research objectives. (Please keep the proposal concise, only 2 pages will be provided reviewers).		
Signature of Principal Investigator 	Date December 21, 2023	Phone Number 612 512 5647
Signature Of Authorized Representative <i>Riana Fletcher</i>	Title Principal Grant and Contract Officer	Date 01/05/2024
Address Of Authorized Representative Office of Sponsored Projects Administration 450 McNamara Alumni Center, 200 Oak Street SE, Minneapolis, MN 55455-2070		Phone Number 612 624 0327

Minnesota Wheat Research and Promotion Council

RESEARCH PROJECT PROPOSAL

(2-pages maximum)

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

Importance of this project to the profitability of wheat producers:

This proposal is to request a 2-year extension of the provision of rapid end-use characterization services provided by the Cereal lab in the department of Food Science and Nutrition to the University of Minnesota (UMN) wheat breeding program. The provision of this service has been very important for the UMN wheat breeding program in allowing the program to assess end-use characteristics of wheat samples at very early stages of the breeding pipeline. With funding from the Minnesota Wheat Research and Promotion Council, we developed predictive models based on parameters from the GlutoPeak Tester for rapidly estimating important end-use wheat characteristics such as Farinograph water absorption of hundreds of wheat samples developed during the early stages of wheat breeding using only 20g samples. The use of the GlutoPeak Tester and the prediction models allows us to screen hundreds of samples for the UMN wheat breeding program. Considering the large quantity (about 50g) of samples and the time required to run these samples on the Farinograph, it would have been impossible to screen this many from the UMN breeding program for their water absorption on time, causing significant delays for the breeding program, Through the provision of this rapid end-use screening service, the cereal lab has been able to predict the water absorption of 2500 wheat samples, which would have taken a significant amount of time to analyze using the Farinograph. Our current funding for the provision of these service however ended on December 31, 2023. Funding is therefore needed to continue the provision of these services to the UMN Wheat breeding program.

Procedures:

Wheat varieties being developed or ready for release by the breeding program and grown at different locations will be rapidly screened for their end-use characteristics using the GPT and their water absorption calculated using predictive models already developed.

A subset of approximately 300 pre-yield trial lines (to represent a larger set of 2,500-3,000) grown at St. Paul and 500 preliminary yield trial lines harvested from the New Zealand winter nursery seed increase will be screened with the GPT and SRC methods. Only 20g of grain is required for this test and it is expected that 25-30% of these ~3,000 lines will be discarded because of weak gluten properties. This test is meant to replace the Mixograph which requires a larger quantity of grain (60g), is slower, and is more prone to instrument operator bias. The SRC method uses water, lactic acid, 5% sodium carbonates and 50% sucrose. The pre-yield trial lines will be screened between October-January to help inform decisions regarding which lines, out of a possible 2,500-3,000 should be selected for advancement as preliminary yield trial lines. Seed of selected lines (preliminary yield trials lines) harvested in New Zealand will be screened between April-August (Table 1)

Table 1: Sampling tracking and analysis information

Generation	No. lines	No. locations	Data to be collected (provider)	Timeline
F5	300	1	GPT & SRC (Annor, this proposal)	Oct-Jan
F7 (2024 PY)	500	1	GPT & SRC (Annor, this proposal)	Apr-Aug
PY	160	2	Full mill & bake (USDA-ARS, Fargo lab)	Mar-Jul
AY3-6	40	2	Full mill & bake (USDA-ARS, Fargo lab)	Mar-Jul
AY2	40	2	Full mill & bake (USDA-ARS, Fargo lab)	Nov-Dec

AY1	60	2	Full mill & bake (USDA-ARS, Fargo lab)	Nov-Feb
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Regional linkage to other research activities:

Collaboration will be with other wheat breeding programs such as the breeding program at NDSU if necessary. This project will collaborate with Dr. Alessandra Marti, a protein expert from the Department of Food Science, Agricultural Plant Science and Agronomy, University of Milan, Milano, Italy and also an Adjunct Professor at the Department of Food Science, University of Minnesota.

List current or potential other funding sources for this project:

We are hoping to submit a proposal to USDA to further support this project. Some funding from my start-up grants will also be used to support this project

Research Group:

The research group consist of myself, Dr. George A. Annor (PI), a Cereal Scientist in the Department of Food Science and Nutrition at the University of Minnesota. Dr. Annor's laboratory is well-equipped for the research and have been working with the Co-PI James Anderson on previously funded research from the Minnesota Wheat Research and Promotion Council. The Co-PI for this research is Dr. James Anderson in the Department of Agronomy and Plant Genetics, and also in charge of the University of Minnesota Spring Wheat Breeding Program.

Relationship to past projects:

This project is a continuation of one that was funded 2 years ago to provide similar services to the University of Minnesota Wheat Breeding Program.

Estimate the budget requirements:Salary

Funding (\$26,000) is requested for the salary of undergraduate students working on the project at \$13,000 per year for the duration of the project.

Supplies

Two thousand (\$1,000) per year, making a total of \$2,000 is being requested for the purchased of supplies and chemicals for running the samples on the Gluten Peak Tester.

Travel: One thousand (\$1,000) per year, making a total of \$2,000 is being requested for travel to the Annual Prairie Grains Conference

References:

Farinograph Method for Flour, AACC Method 54-21. Approved Methods of the AACC, Vol. II, American Association of Cereal Chemists Inc (2000)
(USA)

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RESEARCH PROJECT PROPOSAL BUDGET

Project Title:			
Principal Investigator(s) / Project Director(s)	<u>Funds Requested For</u>		
	Year 1 (2024)	Year 2 (2025)	Year 3 (2026)
A. Salaries and Wages	\$	\$	\$
1. Co-principal Investigator(s)			
2. Senior Associates			
3. Research Associates – Post Doctorate			
4. Other Professionals			
5. Graduate Students			
6. Prebaccalaureate Students	13,000	13,000	
7. Secretarial - Clerical			
8. Technical, Shop and Other			
B. Fringe Benefits			
C. Consulting and Professional Services			
D. Supplies and Services	1,000	1,000	
E. Travel	1,000	1,000	
F. Sub-Contracts			
G. Repairs & Maintenance			
H. Rentals & Lease			
I. Other Expenses			
TOTAL AMOUNT OF THIS REQUEST (per year)	\$ 15000	\$ 15000	\$