FOR ADMINISTRATIVE USE
Program Area Code Proposal Code

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, 2021 - December 31,2022

Note: Research Reports are Due November 15th of Each Year

6. TOTAL PROJECT COST

7. PI #1 PHONE NO.

612 512 5647

8. RESEARCH OBJECTIVES: (List objectives to be accomplished by research grant)

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**	**Phone Number**
	**December 21, 2020**	**612 512 5647**

Signature Of Authorized Representative	**Title:**	**Date:**
	**Principal Grant Administrator**	**12.23.2020**

Address Of Authorized Representative	**Phone Number**
Office of Sponsored Projects Administration 450 McNamara Alumni Center, 200 Oak Street SE, Minneapolis, MN 55455-2070	**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:

The cereal lab at the department of Food Science and Nutrition led by Dr. George Annor has over the years been providing rapid end-use characterization of wheat samples being developed by the University of Minnesota wheat breeding program. With funding from the Minnesota wheat research and promotion council, the cereal lab has been able to develop predictive models for rapidly estimating important end-use wheat characteristics, particularly the Farinograph water absorption of hundreds of wheat samples developed during the early stages of wheat breeding. Without these rapid predictive models developed, it would have been impossible to screen all these samples for water absorption, making it impossible for the wheat breeding program to assess the end use characteristics of wheat samples at the early stages of breeding. Through the provision of this rapid end-use screening service, the cereal lab has been able to screen over 1,200 wheat samples for their water absorption. Analyzing water absorption of over 1,200 wheat samples using the traditional Farinograph (AACCI Method 54-21.02) will take years, time that the Minnesota wheat breeding program does not have to make important decisions in its wheat breeding program. Unfortunately, the current funding for the provision of this service will end on December 30, 2020. If this funding is not continued the cereal lab will not be able to provide this critical piece of service to the Minnesota Wheat Breeding program. We are therefore requesting 2 years of funding to allow the cereal lab to continue providing this screening service

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 500 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 1,000 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	500	1	GPT & SRC (Annor, this proposal)	Oct-Jan
F6 (2020 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

Regional linkage to other research activities:

Collaboration will be sort 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 to 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 ($2,000) per year making a total of $4,000 is being requested for the purchased of supplies and chemicals for running the samples on the Gluten Peak Tester.

References:

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