

**Minnesota Wheat Research and Promotion Council**  
**FULL RESEARCH PROPOSAL TEMPLATE**  
**For Crop Year 2025**  
(Maximum Two Pages, Plus Itemized Budget)

Please Note: To speed up and streamline the granting process, we now require full proposals be submitted by 1:00 PM CST on November 22, 2024. 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:** Influence of Hard Red Spring Wheat Flour Quality and Particle Size distribution on Pasta Characteristics

**Principle Investigator (PI):** Dr. Amrita Ray, Milling Specialist

**Organization:** Northern Crops Institute

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**Additional Investigator(s):** Rilie Morgan, Processing Project Manager

**Organization:** Northern Crops Institute

**Email address and Primary phone number:** [rilie.morgan@ndsu.edu](mailto:rilie.morgan@ndsu.edu); +701-318-6600

**Project Period:** 8 months

**Estimated cost:** \$ 15,856.00

**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.)***

This project explores the potential of various commercial spring wheat flours and farina as alternatives to durum semolina in pasta production. The objective is to assess how flour qualities—such as physical (e.g., particle size distribution) and chemical (e.g., protein content) properties—influence pasta development and key characteristics of the final product, including texture, cooking quality, and sensory attributes. The findings aim to assist pasta processors in understanding how to utilize commercial-available HRS flour or farina and broaden the range of raw materials for producing high-quality pasta.

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

Durum wheat is traditionally chosen for pasta due to its high protein and gluten content, which provide the firmness, elasticity, and chewiness desired in pasta. Interest is growing in using locally grown spring wheat as a cost-effective alternative, and Minnesota, a major producer of hard red spring wheat, is well-positioned to explore this option. Additionally, while it is common for mac and cheese boxed macaroni that is targeted to children to be made with spring wheat for cost reasons, there is a strong trend in higher-quality or “adult” mac and cheese products.

The limited scientific literature available on spring wheat flour for pasta products suggest that it can be a good alternative source given specific characteristic features are met. Protein and gluten content of the flours have a significant role to play in this regard. This project will examine how different physical (e.g., particle size distribution) and chemical (e.g., protein content) qualities of spring wheat flours compare to durum in influencing pasta texture and cooking properties. Success in this area could enable Minnesota wheat farmers to enter the high-value pasta market with regional pasta manufactures of stick-mac or elbow macaroni, boosting local wheat demand and reducing reliance on durum. This project investigates the potential of various commercial spring wheat flours and farina as alternatives to durum semolina in pasta production, aiming to enhance the quality of products like mac and cheese and tap into emerging market trends.

**Research methods:**

Phase 1	<ul style="list-style-type: none"><li>• Procurement of commercially available flour (4), farina (2) and durum semolina (control)</li><li>• Characterization of raw material<ul style="list-style-type: none"><li>➤ Particle size distribution</li><li>➤ Color</li><li>➤ Chemical analysis</li><li>➤ Mixograph</li></ul></li></ul>	April-June, 2025
Phase 2	<ul style="list-style-type: none"><li>• Development of pasta from different raw material</li><li>• Characterization of pasta<ul style="list-style-type: none"><li>➤ Cooking time</li><li>➤ Cooking loss</li><li>➤ Firmness</li><li>➤ Color</li><li>➤ Sensory evaluation</li><li>➤ SEM</li></ul></li></ul>	July-September, 2025
Phase 3	Report writing, article preparation, short blurb for social media posting	October-November, 2025

**Outline the timeline for completion:** 8 months

**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:**

With the approval from the Minnesota Wheat Research and Promotion Council, we will share the reports with regional wheat commissions, trade offices, regional pasta processing facilities, NCI website and brochure, and outreach programs such as short courses, training, exhibition etc. We will also submit the findings to appropriate magazines and other media.

**List potential collaborators or co-investigators you may consider inviting to participate:** No other collaborators have been contacted, but NCI is open to collaboration if suggested.

**Estimate the budget requirements:** \$ 15,856.00 (budget sheet attached)

**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:** No other sources of funding have been requested.

Submit full proposal (max. 2 pages) and itemized budget to [bsorenson@mnwheat.com](mailto:bsorenson@mnwheat.com) by 1:00 PM, 11/22/24