

Minnesota Wheat Research and Promotion Council

RESEARCH PROPOSAL GRANT APPLICATION

1. NAME AND ADDRESS OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Name: North Dakota State University Address: Office of Sponsored Programs Administration Dept #4050 PO Box 6050, Fargo, ND 58108-6050		
2. TITLE OF PROPOSAL <p style="text-align: center;">Strategies for Maintaining Grain Protein in Diverse Spring Wheat Varieties</p>		
3. PRINCIPAL INVESTIGATOR(S) <p style="text-align: center;">Joel Ransom</p>	4. PI #1 BUSINESS ADDRESS NDSU Department of Plant Sciences NDSU Dept. 7610, 166 Loftsgard Hall PO Box 6050 Fargo, ND 58108-6050	
PI# 2 Name:		
PI# 3 Name:		
5. PROPOSED PROJECT DATES (calendar years) 2011-2012 <small>Note: Research Reports are Due November 15th of Each Year</small>	6. TOTAL PROJECT COST \$61,000 (\$30,500 from MWRPC)	7. PI #1 PHONE NO. 701-231-7405
8. RESEARCH OBJECTIVES: (List objectives to be accomplished by research grant) 1-To develop methodology for predicting when in-season N management strategies should be employed in order to maintain high levels of grain protein in a range of currently available cultivars. 2-To verify in-season techniques for achieving higher grain protein. 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
Signature Of Authorized Representative	Title	Date
Address Of Authorized Representative		Phone Number

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Project Title:

Strategies for Maintaining Grain Protein in Diverse Spring Wheat Varieties

Importance and Background:

Maintaining high levels of grain protein has become an important component of profitable spring wheat production, particularly in the Red River Valley, where yields have been increasing and newer varieties vary considerably in their grain protein characteristics. During the last two years, protein content has been an issue also in western ND as conditions were favorable for yield.

Protein discounts/premiums have been a major determinant of the profitability of spring wheat in the last two seasons. The challenge of producing high levels of protein in high yield years, like 2009 and 2010 has been exacerbated by the use of higher yielding varieties with inherently lower grain protein levels (i.e. Traverse and Faller). Growers have been asking for recommendations on how to improve the protein of these newer varieties, while maintaining yield and are seeking ways to do so profitably, given the high cost of nitrogen fertilizer and losses of soil N through leaching and denitrification.

Based on the data developed by this project, farmers will be able to better predict when they might need to apply additional N, in-season, in order to achieve the level of protein desired to obtain a reasonable price at the elevator. Best techniques on how to raise grain protein will also be verified. A graduate student will be trained.

Relationship to Past Projects:

Nitrogen fertilizer trials have been implemented in the past and are the source of the current fertilizer recommendation. A new fertilizer recommendation has recently been released that takes into account the cost of fertilizer when calculating an optimum rate. The use of an application of UAN post flowering to raise protein levels in spring wheat was developed in research at the U of M in Crookston and at the Carrington Research Extension Center. Data from this research suggested that protein could be enhanced by up to 1% protein, though on occasion the increment was much less. Each year recently released varieties are tested for their protein content. Some of the newer varieties, like Faller and Traverse have lower than average levels of protein (Ransom et al., 2009). Raun et al. (2001) found that Greenseeker technology could be used to predict the need for in-season N in winter wheat. This research was primarily focused on yield and not on protein, but this technology may have utility for predicting protein status at the end of the season, if collected at the appropriate growth stage.

Procedures:

This project will be conducted for a minimum of two years in multiple locations in eastern ND and northwestern MN (including with and without tile-drained in one location, which will also help to document the effect of subsurface drainage on yield and protein) and one or more sites in western ND. This work will be conducted collaboratively with Jochum Wiersma who will help manage the experimental site in NW MN. We seek to employ a master student to conduct this research. The research will have two components. The first is to determine if there are in-season measurements that can predict protein status at harvest in diverse genotypes. Possible measurements are: Greenseeker readings, tissue and soil NO₃- levels, and chlorimeter readings at key growth stages. We will seek to correlate these observations with grain protein and yield of four cultivars (two high protein types and two lower protein types), grown at three different levels of N fertilization.

The second component of this study is to verify the effectiveness of various in-season practices on increasing protein content in new varieties with diverse grain protein characteristics. We propose a factorial experiment, where four cultivars (same as those to be used in the previously described study) receive a range of in-season N treatments: (i.e. post anthesis UAN, streamer bar applications with UAN at 5 lf stage, and boot stage, granular urea at boot stage). These treatments will be compared to treatments where all of the fertilizer N is applied at planting at three different rates (additionally one or two treatments where Agrotain or NutriSphere-N is also applied will be included to evaluate the potential impact on protein if less N is lost to the environment). Data to be analyzed will be yield, protein, and market value at different prices per bushel and discount/premiums for protein.

Research Group:

Joel Ransom and Hans Kandel from NDSU, and Jochum Wiersma, U of M. The group will also include a graduate student to be recruited as soon as funding is available.

Regional Linkages to Other Research Activities:

This project will be very strongly linked to some on-going research being conducted by Wiersma and others in MN on the effect of N timing on protein of diverse varieties.

Additional Sources of Funding:

Additional funds have been requested from the State Board of Agricultural Research and Education and the North Dakota Wheat Commission.

References:

Ransom, Mergoum and Simsek. 2009. North Dakota Hard Red Spring Wheat Variety Trial Results for 2009 and Selection Guide. NDSU Extension Service.

Raun, W.R., G.V. Johnson, M.L. Stone, J.B. Solie, E.V. Lukina, W.E. Thomason and J.S. Schepers. 2001. In-season prediction of potential grain yield in winter wheat using canopy reflectance. *Agron. J.* 93:131-138.

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RESEARCH PROPOSAL BUDGET

ORGANIZATION AND ADDRESS			
Name: North Dakota State University Address: Office of Sponsored Programs Administration Dept #4050 PO Box 6050 Fargo, ND 58108-6050	THIS BUDGET IS FOR THE REQUEST FROM MWRPC ONLY (matching funds are requested from ND sources)		
Principal Investigator(s) / Project Directors(s)	Funds Requested For		
Joel Ransom	Year 1 (2011)	Year 2 (2012)	Year 3 (2013)
A. Salaries and Wages	\$	\$	\$
1. Co-principal Investigator(s)			
2. Senior Associates			
3. Research Associates - Post Doctorate			
4. Other Professionals			
5. Graduate Students	8,000	8,000	
6. Prebaccalaureate Students	2,000	2,000	
7. Secretarial - Clerical			
8. Technical, Shop and Other			
B. Fringe Benefits @ 2% for grads and 10% undergrad	360	360	
C. Nonexpendable Equipment (Planting and harvesting equipment use)			
D. Materials and Supplies	2,390	2,390	
E. Travel	2,500	2,500	
F. Publication Costs			
G. Computer Costs			
H. All Other Direct Costs (Attach supporting data) - Purchase of Service -			
I. TOTAL AMOUNT OF THIS REQUEST (per year)	\$ 15,250	\$ 15,250	\$ NA